
विट्रियस इनैमल कोटिंग्स का रंग प्रतिधारण
— परीक्षण पद्धति
(पहला पुनरीक्षण)

Colour Retention of Vitreous
Enamel Coatings — Method of Test
(First Revision)

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Ceramicware Sectional Committee had been approved by the Chemical Division Council.

Correlation between results of the cupric sulphate test prescribed in this standard and outdoor exposure tests of enamels coloured with cadmium sulphide or cadmium sulpho-selenide pigments shows that the test is an effective indicator of the tendency for such coatings to undergo appreciable colour changes during weathering. This test method is considered useful for specification acceptance, quality control and research and development purposes.

This standard was first published in 1977 by taking assistance from the publication C-538-1983 'Standard test method for colour retention of red, orange and yellow porcelain enamels', issued by the American Society for Testing and Materials (ASTM), USA.

In the first revision, the light source for the test have been updated based on the current market availability and the standard has been updated based on the experience of last four decades and on the currently available data.

The composition of the Committee responsible for formulation of this standard is listed in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.

*Indian Standard***COLOUR RETENTION OF VITREOUS ENAMEL COATINGS —
METHOD OF TEST***(First Revision)***1 SCOPE**

This standard prescribes a method of test for colour retention of vitreous enamel coatings containing cadmium sulphide or cadmium sulpho-selenide type pigments.

NOTE — The purpose of the test is to detect those red, yellow, orange and some green enamels that are likely to undergo appreciable change in colour upon exposure to atmospheric corrosion.

2 REFERENCES

The standards given below contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

<i>IS No.</i>	<i>Title</i>
IS 261 : 1982	Specification for copper sulphate (<i>second revision</i>)
IS 1070 : 1992	Reagent grade water — Specification (<i>third revision</i>)
IS 2418 2018	Tubular fluorescent lamps for (Part 2) : general lighting service: Part 2 Performance requirements (<i>second revision</i>)
IS 2717 : 1979	Glossary of terms relating to vitreous enamelware and ceramic — Metal systems (<i>first revision</i>)

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 2717 shall apply.

4 TEST SPECIMENS

Test specimens measuring not less than 50 mm × 50 mm shall be cut out from enamelware drawn as specified in individual material specifications. Test specimens shall be reasonably flat. They may also be prepared by firing along with the enamelware.

5 PRINCIPLE

Cupric sulphate solution is placed on the surface of the test specimen and allowed to remain there for 20 h under controlled illumination. The surface is then washed, dried and examined visually for

darkening of the colour in the area that was treated with cupric sulphate solution.

NOTE — In some cases, the treatment may change the gloss of the treated area. Any such change in gloss shall be ignored.

6 APPARATUS

The apparatus shall comprise a box, made of plywood or other suitable material, and having internal dimensions approximately 650 mm × 150 mm × 300 mm. The box shall be painted matte white on the inside and shall be fitted with a 110 V, 18 W cool white tubular fluorescent lamp [see IS 2418 (Part 2)] in such a position that the distance inside the box, between the specimen surface and the centre line of the lamp is 230 mm. The box shall also be provided with vents for air circulation. Ventilation is accomplished by 11 holes, 13 mm in diameter drilled 26 mm apart on a centre line 26 mm from the inside top. Eleven similar holes are also drilled on a centre line 26 mm from the bottom on each of the two long sides of the box.

7 REAGENT

7.1 Cupric Sulphate Solution — Weigh 50 g of analytical reagent grade cupric sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$) (see IS 261) and dissolve in 100 ml of hot distilled water (see IS 1070) in a 250 ml glass beaker and allow to age at a temperature of $(27 \pm 2)^\circ\text{C}$ for 16 h or longer with occasional stirring.

NOTE — This ageing treatment produces a solution with some undissolved material remaining at the bottom of the beaker.

8 PROCEDURE

8.1 Clean the specimen by washing with soap and water, followed by copious rinsing with clean, but not necessarily distilled water. Dry the surface with clean dry towel by blotting or gentle rubbing.

8.2 Place several drops of aged cupric sulphate solution (see 7.1) on the horizontal test surface of the specimen to form a pool, and immediately cover with a clean 25 mm diameter watch-glass having fire-polished edges. The quantity of the solution used shall be sufficient to fill the inverted watch-glass except for a small bubble of entrapped air.

Remove any excess solution from the test area not under the watch-glass.

NOTE — In some cases it may be necessary to seal the area of contact between the watch-glass and the specimen surface with some material, such as modelling clay or rubber cement, to prevent escape of the solution.

8.3 Place the specimen with watch-glass in position in the test chamber maintained at $(27 \pm 2) ^\circ\text{C}$ and keep it in that position for 20 h.

NOTE — If the solution escaped or dried out at the end of the test period, the test is invalid and shall be repeated on a different location on the specimen surface.

8.4 After exposure, remove the watch-glass, rinse the treated area with water to remove all the test solution and dry with a clean cloth.

8.5 Visually examine the specimen immediately to determine whether there has been any darkening of

the treating area. Use partially diffused light, supplemented, if necessary, by artificial light, the total intensity being approximately that available within a short distance from an outside window, but do not examine in direct sunlight. During observation, the specimen shall be held near a light source (such as a window) at a distance not less than the minimum width of the source.

8.6 The specimen shall be considered to have failed in the test if any darkening of the treated area in relation to the untreated area is observed. Changes in the gloss caused by the treatment shall be ignored.

9 REPORT

Report the type, colour, number of specimens tested, and whether each specimen passed or failed the test.

ANNEX A*(Foreword)***COMMITTEE COMPOSITION**

Ceramicware Sectional Committee, CHD 09

<i>Organization</i>	<i>Representative(s)</i>
CSIR - Central Glass and Ceramic Research Institute, Kolkata	DR SUMAN KUMARI MISHRA (Chairperson)
Aditya Birla Insulators Company, Halol	SHRI MALLIKARJUN BANAGUNDI SHRI SUDHARSHAN C. (<i>Alternate</i>)
Ahmedabad Pottery Manufacturers Association, Naroda	SHRI RUPESH C. SHAH
All India Institute of Hygiene and Public Health, Kolkata	PROF R. C. SRIVASTAVA DR NIBEDITA DAS (<i>Alternate</i>)
All India Pottery Manufacturers Association, Kolkata	SHRI GOUTAM HAZRA SHRI SABYASACHI ROY (<i>Alternate I</i>) SHRI SANDIP KUMAR (<i>Alternate II</i>)
Ants Ceramics Private Limited, Thane	SHRI ASHWINI JAIN SHRI SABYASACHI ROY (<i>Alternate</i>)
Associated Soapstone Distributing Company Private Limited, Jaipur	SHRI DILIP JHA SHRI RAJENDRA PAREEK (<i>Alternate I</i>) SHRI AMIT SHARMA (<i>Alternate II</i>)
Bhabha Atomic Research Centre, Mumbai	DR DEEP PRAKASH DR ABHIJIT GHOSH (<i>Alternate</i>)
Bharat Heavy Electrical Limited, New Delhi	DR C. D. MADHUSOODANA SHRI G. THIRUPATHI (<i>Alternate</i>)
CAPEXIL, Kolkata	SHRI SAMIR GHOSH
CSIR - Central Glass and Ceramic Research Institute, Kolkata	DR H. S. TRIPATHI DR SOMNATH SINHAMAHAPATRA (<i>Alternate</i>)
Cera Sanitaryware Limited, Kadi	SHRI PRAMOD CHAUHAN
Clay Craft India Private Limited, Jaipur	SHRI BHARAT AGARWAL SHRI PRADIP KUMAR AGARWAL (<i>Alternate</i>)
Department of Defence Production, Ministry of Defence, New Delhi	COL D. B. S. KUSHWAHA SHRI D. K. MOHAPATRA (<i>Alternate</i>)
Directorate General of Quality Assurance, Ministry of Defence, New Delhi	SHRI V. R. CHAUDHARY DR K. C. GUPTA (<i>Alternate</i>)
Government College of Engineering and Ceramic Technology, Kolkata	SHRI RAM CHANDRA DAS
H. R. Johnson (India) Limited, Dewas	SHRI SUDIPTA SAHA
HSIL Limited, Bahadurgarh, Haryana	DR R. K. SOMANY SHRI T. K. RAHA (<i>Alternate</i>)
Indian Institute of Technology BHU, Varanasi	PROF VINAY KUMAR SINGH DR MANAS RANJAN MAJHI (<i>Alternate</i>)
Industries Commissioner, Gandhinagar	SHRI R. D. BARHATT
MSME Testing Center, New Delhi	SHRI AMBROSE ROYSON C. SHRI G. V. RANGARAO (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
National Institute of Technology, Rourkela	PROF DEBASISH SARKAR PROF RITWIK SARKAR (<i>Alternate</i>)
National Test House, Kolkata	DR S. K. KULSHRESHTHA SHRI VINAY KUMAR (<i>Alternate</i>)
Porcelain Enameled Association, Kolkata	SHRI B. S. GANGULY DR SOMESWAR DATTA (<i>Alternate</i>)
Roca Bathroom Products Private Limited, Chennai	SHRI S. ARAVAZHI
Saint-Gobain India Private Limited, Chennai	SHRI MANISH KUMAR
Somany Ceramics Limited, Bahadurgarh	SHRI T. SRIDHAR
In Personal Capacity (BC-224, Sec-1, Salt Lake, Kolkata, West Bengal-700064)	SHRI K. K. PAUL
BIS Directorate General	A. K. LAL SCIENTIST 'F'/DIRECTOR AND HEAD (CHEMICAL DEPARTMENT) [REPRESENTING DIRECTOR GENERAL, BIS (<i>Ex-officio</i>)]

Member Secretary
MS BUNTY MUDI
SCIENTIST 'B'/ASSISTANT DIRECTOR
CHEMICAL DEPARTMENT , BIS

Bureau of Indian Standards

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Amendments Issued Since Publication

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